

Nanotechnology

One of the key research focus areas at DRILS is the advancement of drug delivery systems, with a particular emphasis on leveraging innovative nanoparticles. Employing diverse methodologies, our research aims to develop highly efficient drug delivery mechanisms, incorporating cutting-edge technologies like microneedles, lipid nanoparticles, and hydrogel nano- and micro-particles. A crucial aspect of Dr. Marina's work involves precise control over the morphology and dimensions of existing bioactive compounds at the nano- and sub-micro levels, enabling the manipulation of their biological activities. The primary research objective is to explore innovative solutions for challenges in Drug Resistance and Nutrient Deficiencies.

Nanotechnology and drug resistance

In the current era marked by rapidly escalating antimicrobial resistance (AMR) and declining rates of antibiotic discovery, there is an urgent need for novel strategies to effectively combat infections, particularly those caused by resistant microbes. The demand extends beyond mere efficacy against pathogens. Antimicrobial therapies that minimally impact the healthy human microbiome are highly sought after. At DRILS, Dr. Marina and her team's objective is to pioneer an antibiotic-free platform technology, representing a transformative approach to infection treatment. Their technology relies on biocompatible nanoparticles intricately linked to pathogen-specific aptamers and loaded with a non-antibiotic bactericide. This innovative platform not only aims to address infections effectively but also minimizes impact on the healthy microbiome. Additionally, the platform holds promise for enabling targeted, pathogen-specific delivery of both existing and novel antimicrobials. This approach, by reducing overall antibiotic usage, has the potential to significantly mitigate the growing threat of AMR.

Nanotechnology and nutrient deficiencies

In the context of nutrient deficiencies, we strive to introduce technological advancements that enhance compliance and simplify nutrient delivery, overcoming current limitations. Our project focuses on creating a biodegradable, sustained-release, self-administered microneedle transdermal patch loaded with essential micronutrients for preventing and treating anaemia. The controlled release eliminates the need for daily intake, addressing bioavailability concerns and minimizing side effects, thereby improving overall compliance. This versatile formulation can be adapted for other long-term drugs used in treating chronic or lifelong diseases.

General Approach:
Nanomaterials Synthesis
and Application:



**NANOTECHNOLOGY
MEDIATED
DRUG DELIVERY**

Project Showcase:
**Microneedles-based
Drug Delivery**

